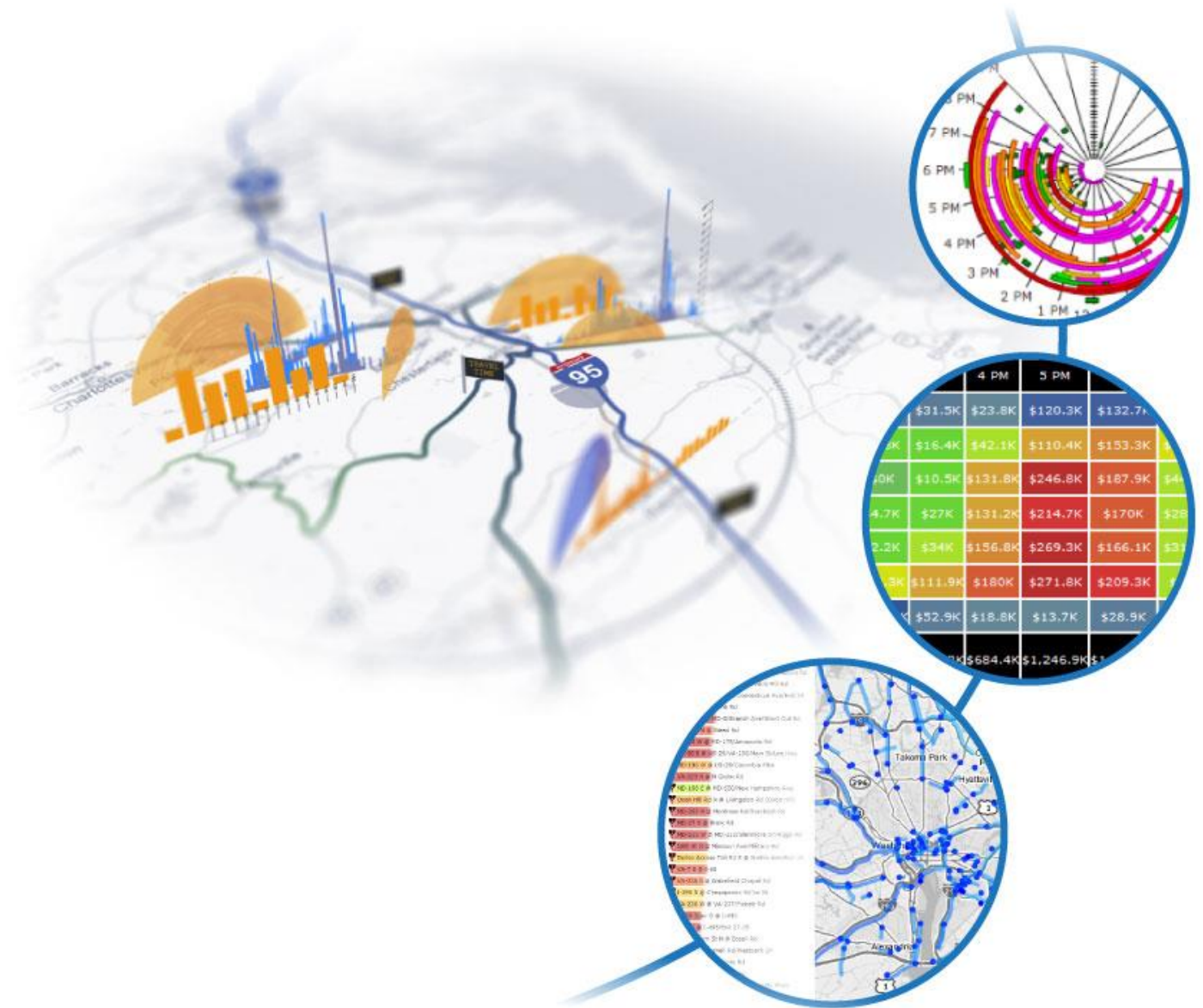


The Impact of Performance Measures Methodologies on Meaning and Interpretation



Michael L. Pack, University of Maryland
CATT Laboratory



MAP-21 Notice of Proposed Rulemaking

Measures Category	AASHTO Initial Recommendations
Performance of Interstate System	<ul style="list-style-type: none">• Annual Hours of Delay• Reliability Index (80th percentile)• Flexible target setting• Threshold recommendations are ambiguous.
Performance of Non-Interstate NHS	
Traffic Congestion	
On-Road Mobile Source Emissions	<ul style="list-style-type: none">• Reduction in VOC, NOx, PM, and CO• Flexible target setting• Required only for areas already required to report emissions reductions.
Freight Movement on the Interstate System	<ul style="list-style-type: none">• Freight recommendations are similar to the congestion performance measures recommendations for passenger vehicles.



What do many states think about this?



State Concerns: there are many...

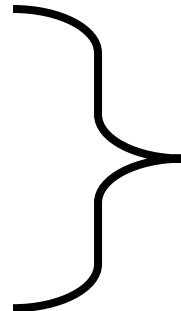
- No Data:

- Several Solutions
 - NPMRDS
 - & other Private Sector Data

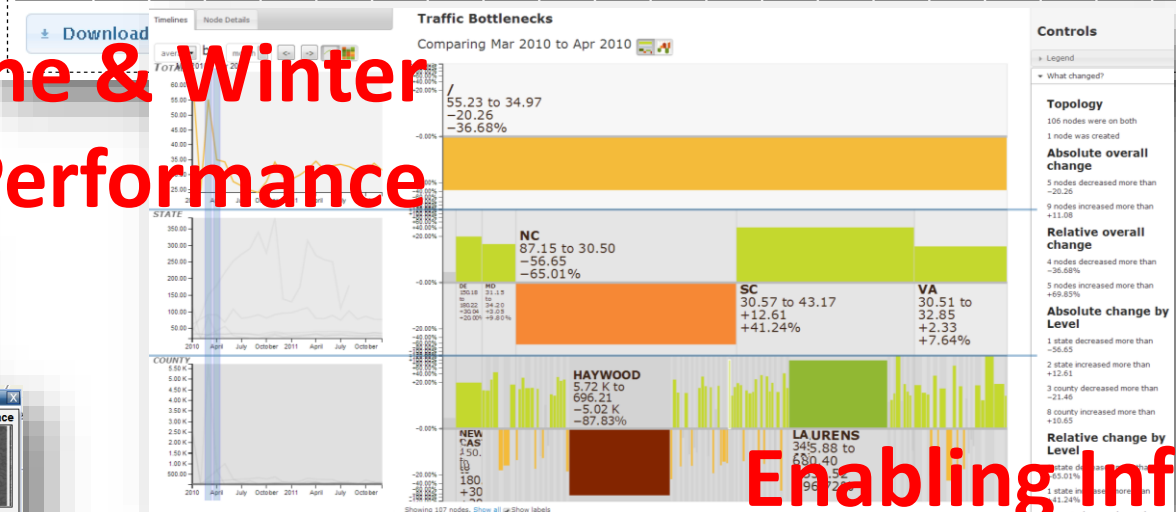
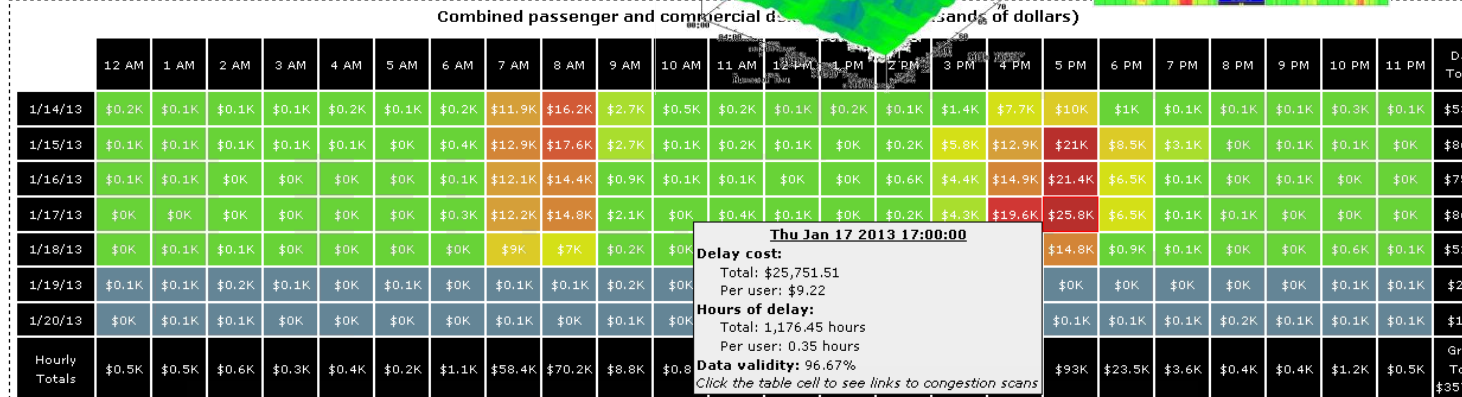
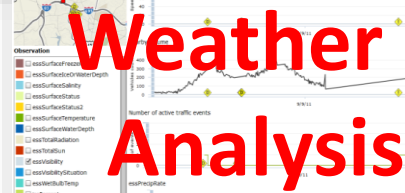


- Capacity to analyze:

- Several Solutions
 - Universities
 - Consultants
 - Private Sector Tools
 - Public Sector Tools



Congestion Analysis

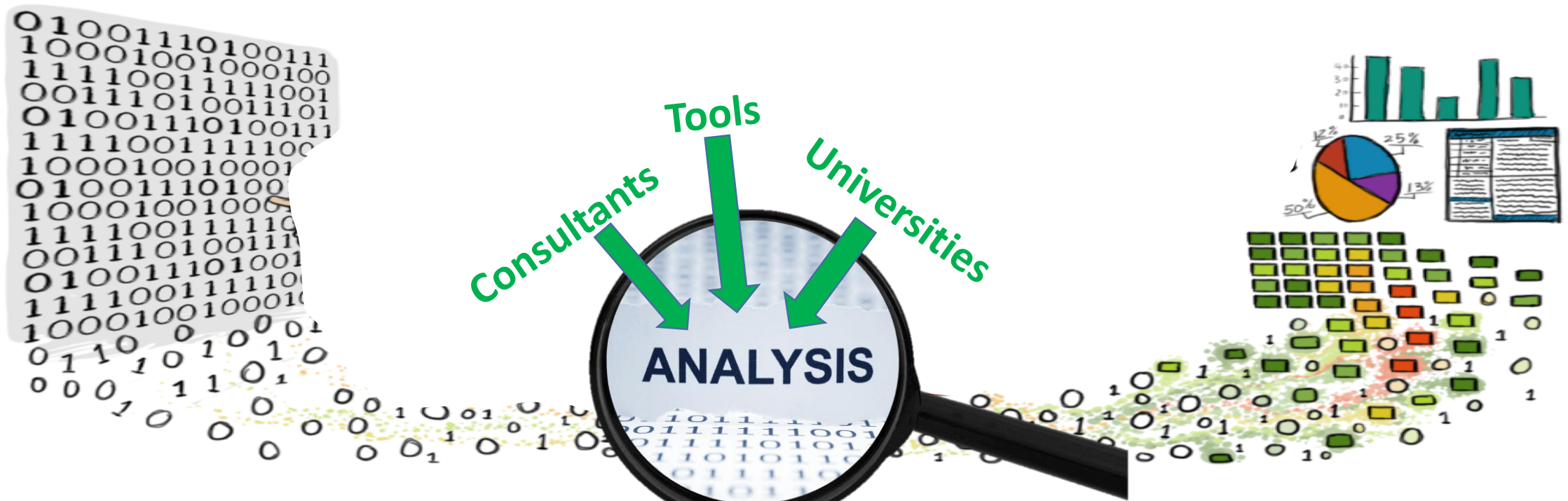


Enabling Informed Decision Making

What *should* be the concern?

Strict Guidance & Interpretation:

it is a misconception that standardized data leads to standardized reporting. Even with a uniform, national dataset, each agency may choose to implement *subtle* differences in their calculations which could lead to different results.



Example: Reliability & the Buffer Time Index

$$\frac{(95\% \text{ Travel Time} - \text{Average Travel Time})}{\text{Average Travel Time}}$$

Seems pretty straight forward, right?!

The issues on the following slides
are **REAL**.

These come from over 20 states and
5+ consultants/universities who do this
professionally.

$$\frac{(95\% \text{ Travel Time} - \text{Average Travel Time})}{\text{Average Travel Time}}$$

Philosophical Issue:

- What's the correct %?

95% 80% 75% ???



Employer perspective:

- Is it okay to be significantly late to work, a meeting, etc. once/week?
- Or is it okay to be significantly late to these things once per month?

What about daycare? School? Doctor's Appointments?

$$\frac{(95\% \text{ Travel Time} - \text{Average Travel Time})}{\text{Average Travel Time}}$$

Mathematical Issue

Agency 1: single value for the entire data set

Agency 2: Monthly aggregate values for each segment, broken down by day-of-week and hour-of-day.

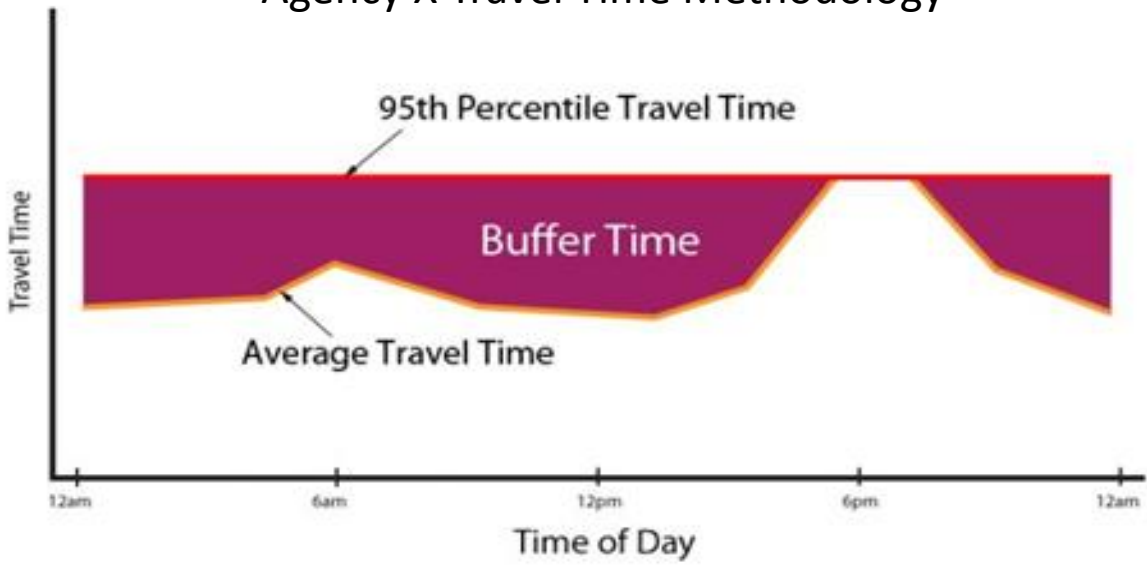
Case Study

- Analyze travel time data for:
 - weekdays:
 - the month of January.

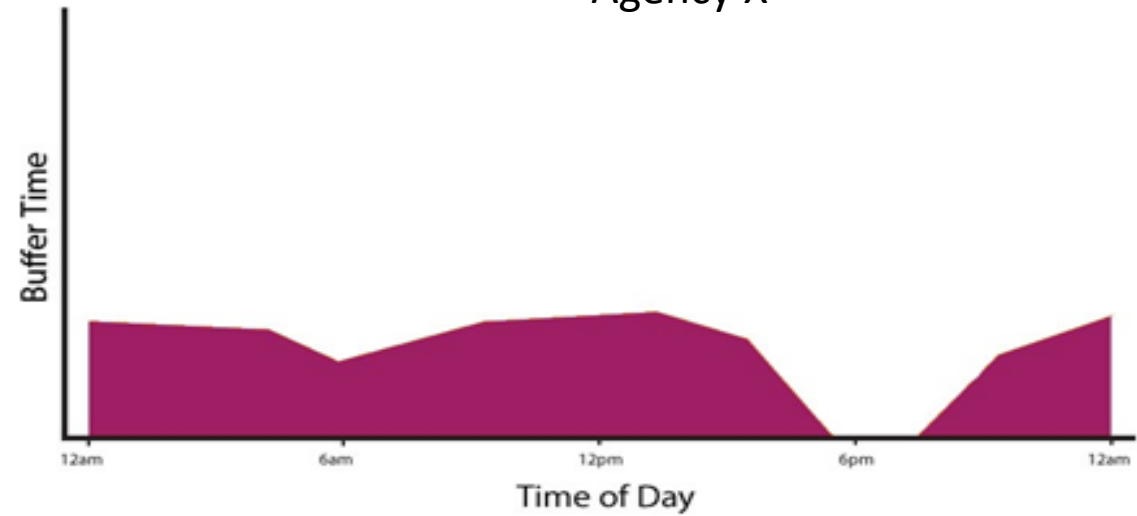
JANUARY						
SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

- How would the two approaches change the meaning of reliability?

Agency X Travel Time Methodology



Agency X



$$\frac{(95\% \text{ Travel Time} - \text{Average Travel Time})}{\text{Average Travel Time}}$$

How should we calculate the AVERAGE TRAVEL TIME?

Agency X's method: Use avg. of the date-range being analyzed. "Actual Average Travel Time"

Date:	
7:00	
8:00	
9:00	
10:00	

September 2012				
Monday	Tuesday	Wednesday	Thursday	Friday
3	4	5	6	7

Month

MARCH 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Year

2014


JANUARY	FEBRUARY	MARCH
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
APRIL	MAY	JUNE
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
JULY	AUGUST	SEPTEMBER
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
OCTOBER	NOVEMBER	DECEMBER
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Agency Y method: a "Historic Average Travel Time", broken down by day of week and hour of day. This value is based on data received for the given day of week and hour of day, not just the data set being analyzed, and supposedly represents what travelers expect the travel time to be on a larger scale. (yearly, quarterly/seasonal, or multi-year)

Case Study

- Analyze travel time data for:
 - a single month along a road on which a major road construction project was occurring.

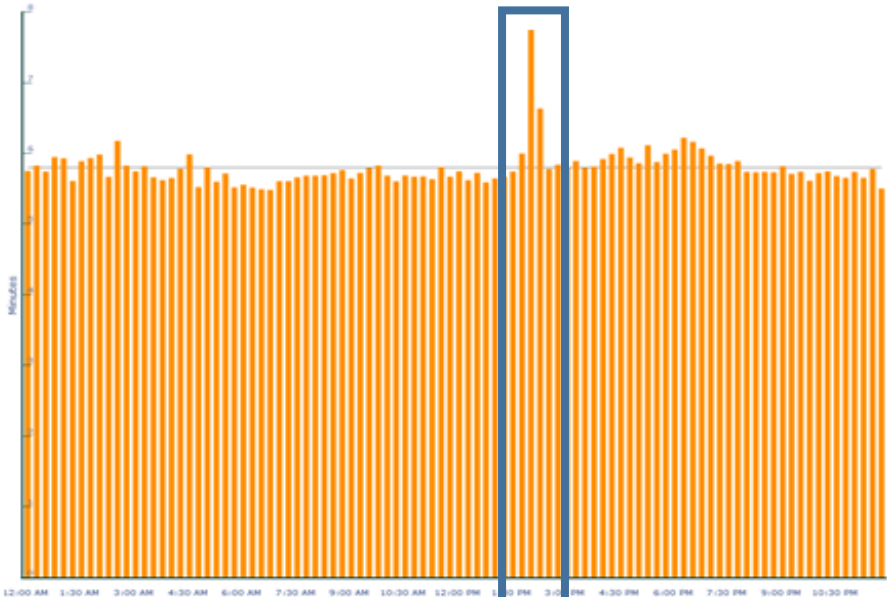
JANUARY						
SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8		10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
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- How would the two approaches change the meaning of reliability?

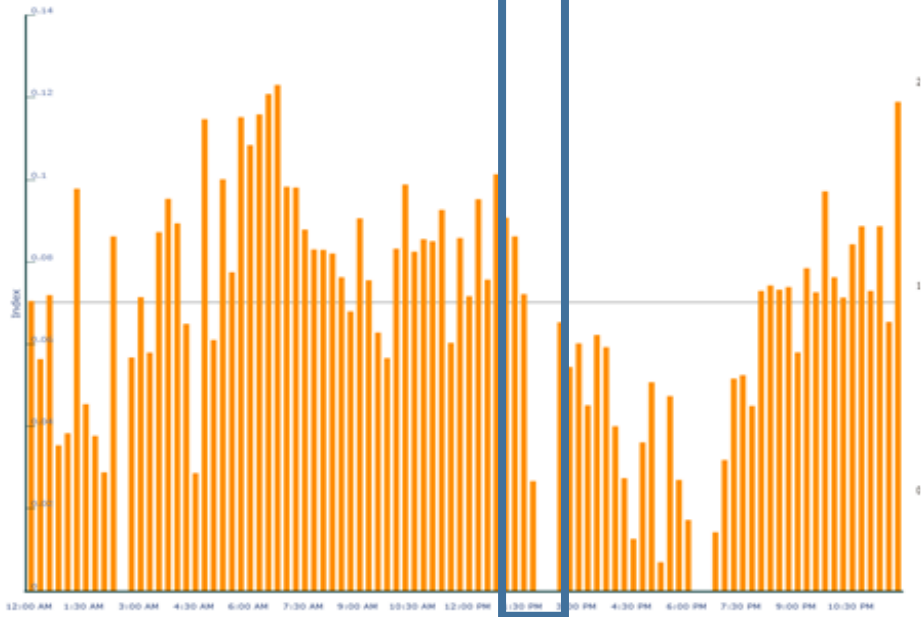
Agency X

Travel Time
minutes



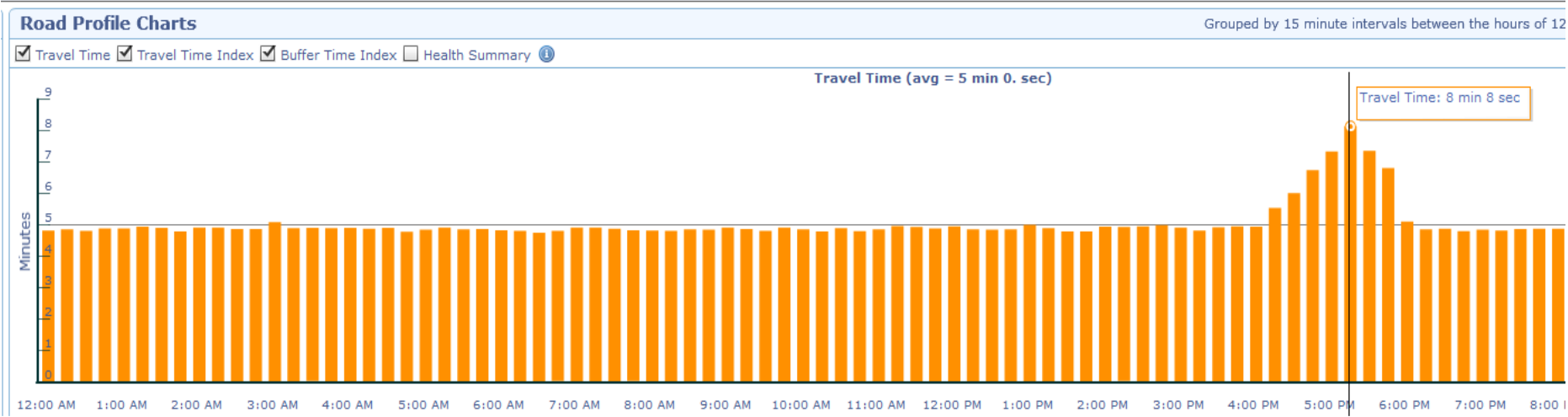
Time of Day

Buffer Time
Index



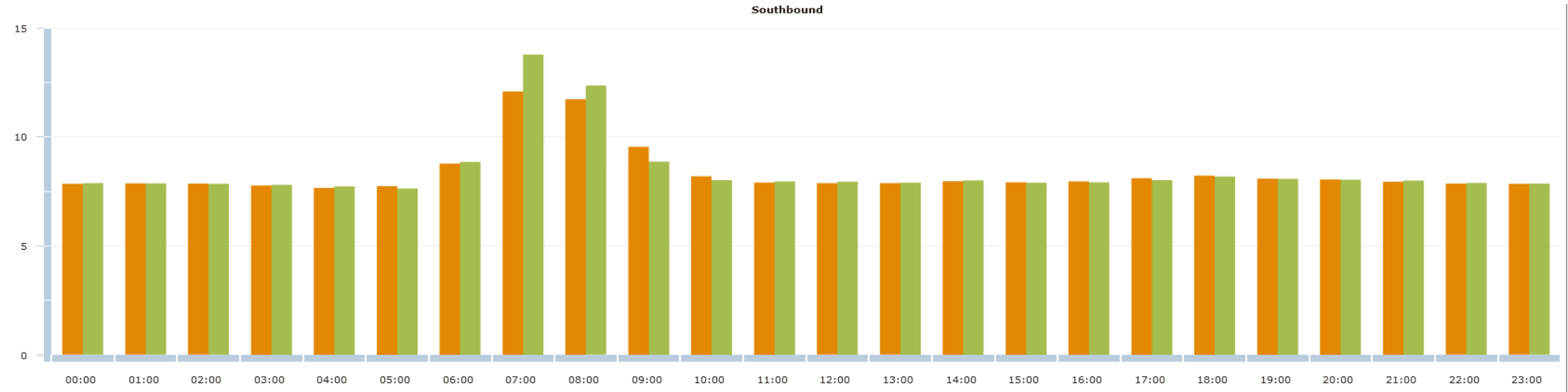
Rush Hour Example

Travel Time
by Time of Day

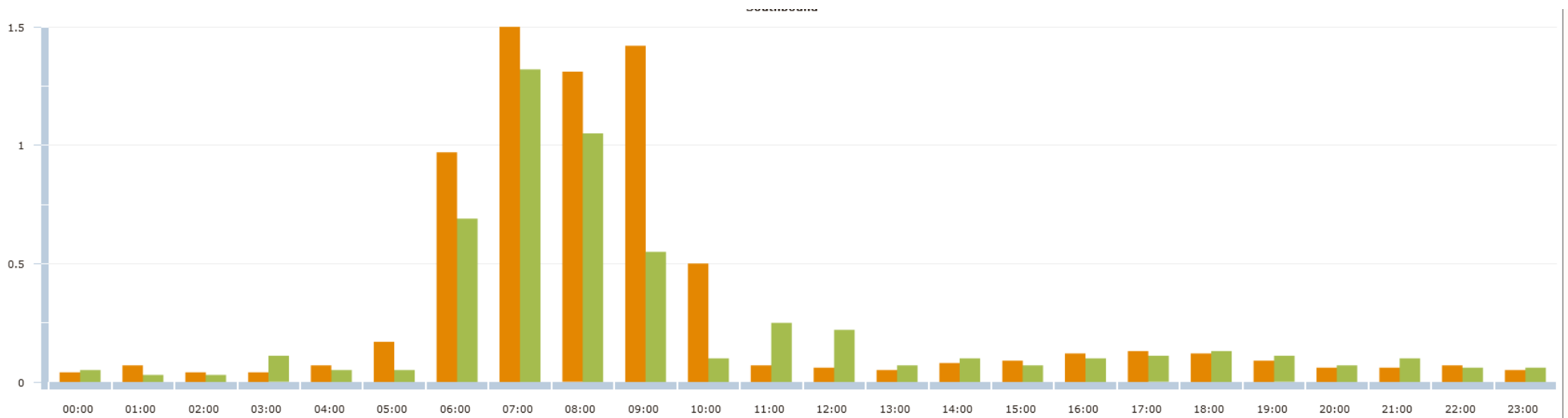


Rush Hour Example

Travel Time

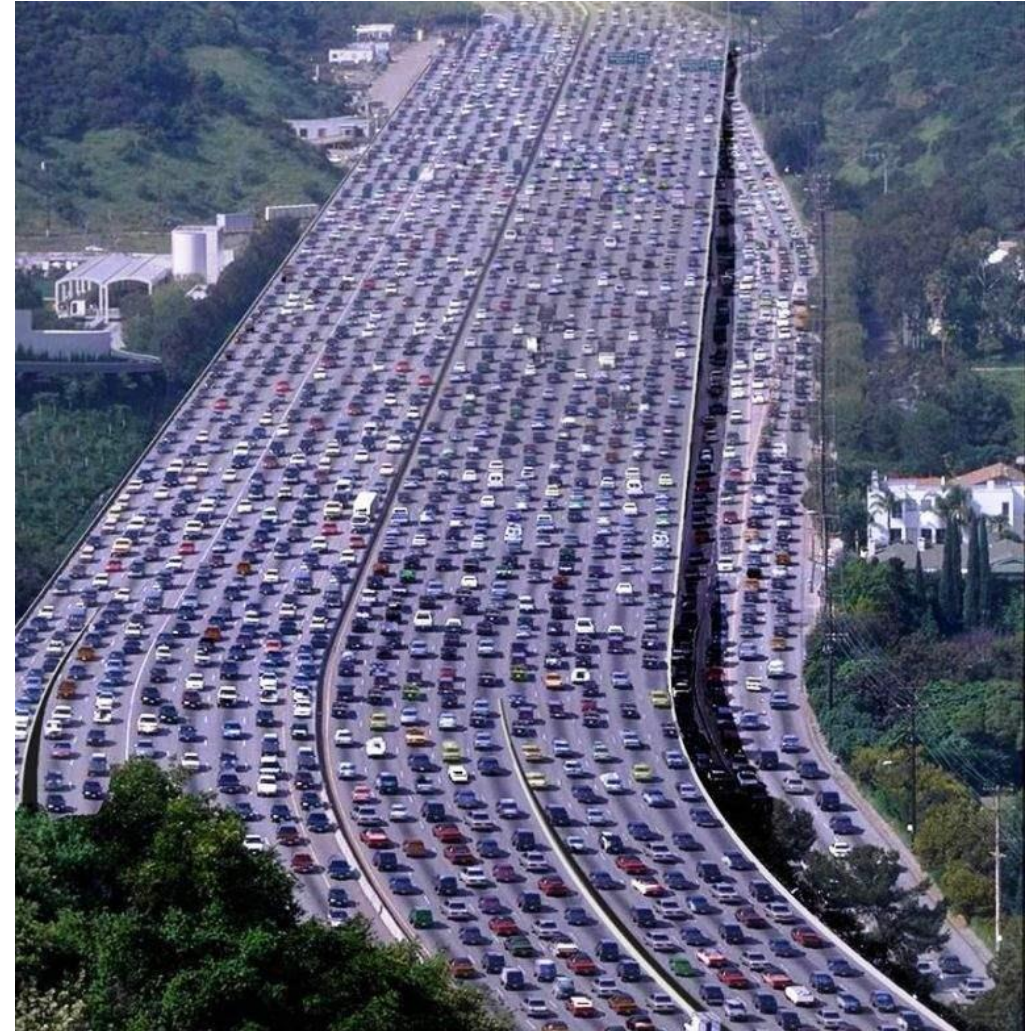


Buffer Time Index



Example 3: Defining congestion

- What's the threshold for Congestion in:



As we move forward

- Standardization of Definitions & Methodologies is critical.
- ONLY documenting each agency's methods will:
 - allow for reproducibility, but
 - will NOT allow for any form of national performance reporting



Partners in Using Archived
Operations Data



Thank you!

- Michael L. Pack
PackML@umd.edu
301.405.0722

